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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/692,827	10/24/2003	Baiyi Zhao	2002B130A/2	9211
23455 7590 07/31/2007 EXXONMOBIL CHEMICAL COMPANY 5200 BAYWAY DRIVE P.O. BOX 2149 BAYTOWN, TX 77522-2149			EXAMINER MCDONOUGH, JAMES E	
			ART UNIT 1755	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/692,827	Applicant(s) ZHAO ET AL.	
	Examiner James E. McDonough	Art Unit 1755	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 July 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20, 27-31 and 36-40 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20, 27-31, and 36-40 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

With respect to applicants argument against the withdrawal of claims 41 and 42 has been considered and found not persuasive.

Applicant's election with traverse of species in the reply filed 11/4/2005 is acknowledged. The traversal is on the ground(s) that the species are not distinct. This is not found persuasive because applicant has not submitted evidence or identified such evidence now of record showing the species to be obvious variants or clearly admit on the record that this is the case.

The requirement is still deemed proper and is therefore made FINAL.

All original rejections have been withdrawn in favor of the new rejections.

New Arguments

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 11, 12, 14, and 27 are rejected as being indefinite because claims one and two teach that the X ligands are selected from the group consisting of hydride, radicals, hydrocarbyl radicals, substituted hydrocarbyl radicals, and hydrocarbyl organometalloid radicals, however, these other claims have X ligands that do not fit this description. Correction required.

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Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1-20, 27-31 and 36-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sumi et al. (USP 6,323,353) in view of Baardman et al. (USP 5,658,982) in further view of Qian et al. "Synthesis and Polymerization Behavior of Various Substituted Half-Sandwich Titanium Complexes Cp'TiCl₂(OR*) as Catalyst for Syndiotactic polystyrene"; J. Mol. Cat.; 208; 2004, 45-54.

Sumi substantially discloses the invention as claimed (col. 2, 1. 56 to col. 3, 1. 50; col. 4, 1. 5, 1. 50; col. 10, 1. 20; col. 16, 1. 66 to col. 17, 1. 61, examples 14 and 15).

Although, Sumi does not explicitly disclose the specific activators, Sumi does disclose the rest of the limitations of the claims. However, because Baardman teaches addition of tris(perfluorophenyl)borane greatly increase the rate of polymerization with

catalyst (column 8, lines 42-46), it would have been prima facie obvious to someone of ordinary skill in the art at the time the invention was made to modify the teachings of Sumi, by including tris(perfluorophenyl)borane as the activator/co-catalyst/second catalyst, as suggested by Baardman.

The abstractable ligands in the primary reference are halogen, however, because Qian teaches in catalyst complexes used for polymerizing olefins that it is obvious to substitute halogen ligands for hydrocarbyl ligands and vice versa as it is known these changes will provide a change the activity of the catalyst and the properties of the polymer produced, it would have been prima facie obvious to someone of ordinary skill in the art at the time the invention was made to modify the teachings of the primary reference, by substituting halogen ligands for hydrocarbyl ligands, as suggested by Qian.

Claims 1-20, 27-31 and 36-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Buchwald et al. (USP 6,307,087) in view of Baardman et al. (USP 5,658,982) in further view of Qian et al. "Synthesis and Polymerization Behavior of Various Substituted Half-Sandwich Titanium Complexes $\text{Cp}^*\text{TiCl}_2(\text{OR}^*)$ as Catalyst for Syndiotactic polystyrene"; J. Mol. Cat.; 208; 2004, 45-54.

Buchwald substantially discloses the invention as claimed (col. 7, 1. 5-44; col. 9, 1. 1-42; col. 25, 1. 63; col. 31, 1. 40 to col. 32, 1. 32; col. 33, 1. 56 to col. 34, 1. 16).

Although, Buchwald does not explicitly disclose the specific activators, Buchwald does disclose the rest of the limitations of the claims. However, because Baardman

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teaches addition of tris(perfluorophenyl)borane greatly increase the rate of polymerization with catalyst (column 8, lines 42-46), it would have been prima facie obvious to someone of ordinary skill in the art at the time the invention was made to modify the teachings of Buchwald, by including tris(perfluorophenyl)borane as the activator/co-catalyst/second catalyst, as suggested by Baardman.

The abstractable ligands in the primary reference are halogen, however, because Qian teaches in catalyst complexes used for polymerizing olefins that it is obvious to substitute halogen ligands for hydrocarbyl ligands and vice versa as it is known these changes will provide a change the activity of the catalyst and the properties of the polymer produced, it would have been prima facie obvious to someone of ordinary skill in the art at the time the invention was made to modify the teachings of the primary reference, by substituting halogen ligands for hydrocarbyl ligands, as suggested by Qian.

Claims 1-20, 27-31 and 36-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhang et al. (USP 6,525,210) in view of Baardman et al. (USP 5,658,982) in further view of Qian et al. "Synthesis and Polymerization Behavior of Various Substituted Half-Sandwich Titanium Complexes $Cp^*TiCl_2(OR^*)$ as Catalyst for Syndiotactic polystyrene"; J. Mol. Cat.; 208; 2004, 45-54.

Zhang substantially discloses the invention (col. 3, 1. 25-45; col. 10, 1. 20-65; col. 11, 1. 1-55; col. 17, 1. 60; col. 21, 1. 7-25, 1. 51-62).

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Although, Zhang does not explicitly disclose the specific activators, Zhang does disclose the rest of the limitations of the claims. However, because Baardman teaches addition of tris(perfluorophenyl)borane greatly increase the rate of polymerization with catalyst (column 8, lines 42-46), it would have been prima facie obvious to someone of ordinary skill in the art at the time the invention was made to modify the teachings of Zhang, by including tris(perfluorophenyl)borane as the activator/co-catalyst/second catalyst, as suggested by Baardman.

The abstractable ligands in the primary reference are halogen, however, because Qian teaches in catalyst complexes used for polymerizing olefins that it is obvious to substitute halogen ligands for hydrocarbyl ligands and vice versa as it is known these changes will provide a change the activity of the catalyst and the properties of the polymer produced, it would have been prima facie obvious to someone of ordinary skill in the art at the time the invention was made to modify the teachings of the primary reference, by substituting halogen ligands for hydrocarbyl ligands, as suggested by Qian.

Claim 40 is rejected as being unpatentable over any of Sumi (USP 6,323,353), Buchwald (USP 6,307,087), or Zhang (USP 6,525,210) in view of Baardman (USP 5,658,982) as applied to claims 1-20, 27-31 and 36-39 above in further view of Piekarski et al. (USP 3,991,259).

The disclosures of Sumi et al., Buchwald et al., Zhang et al., and Baardman et al. have been discussed above.

Neither Sumi, Buchwald, nor Zhang explicitly disclose the use of supports, however, because Piekarski teaches that the activity of many catalyst can be increased by depositing them on solid supports such as polymeric materials and refractory oxides (column 7, lines 18-48), it would have been prima facie obvious to someone of ordinary skill in the art at the time the invention was made to modify the above teachings, by incorporating a solid support, as suggested by Piekarski.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1-20, 27-31, and 36-40 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 2-6 and 9-17 of copending Application No. 10/693,584. Although the conflicting claims are

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not identical, they are not patentably distinct from each other because the claims of the two applications disclose substantially the same subject matter.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Response to Arguments

Applicants arguments have been fully considered, most of these are moot in view of the new rejections, however, the ones that would effect the new rejections are discussed below.

Applicants argue that biphenylene and bi naphthalene are two completely different ligands. This is found not persuasive because while it is true that these are different chemical species binaphthylene is a derivative of biphenyl and 1.) Applicants ligand from page 10, column 1, second down of the claims shows the ligand biphenyl, but clearly has R groups where there should be hydrogens if this was indeed limited to only biphenyl, and the claim even states that these can be C1-C50 hydrocarbon radicals, and binaphthylene clearly fits this description, contrary to applicants assertion it does not 2.)The extra rings in this system are so far removed from the metal center or even the donor atoms of the ligand, when bound as a ligand to have any substantial electronic or steric effect 3.) It is common in the art of chemistry to substitute a phenyl ring with a naphthyl ring as further evidenced by Fabian et al.; "Modeling the Chromatic

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Enantioseparation of Aryl- and Hetarycarbinols on ULMO, a Brush-Type Chiral Stationary phase, by 3D-QSAR Techniques"; CHIRALITY 15:271-275 (203) also the references cited in this article would also be of use to show this 4.) if one wanted to perform asymmetric catalysis binaphthylene would actually be better than biphenylene as the binaphthylene ligand will have chirality inherent in it because the hydrogens on the extra rings produce a steric effect that causes the two naphthylene groups to torque out of the plane producing chirality and would not be planar anymore as would be expected for an aromatic system such as biphenyl, which will be planar.

Applicants argue that since in the structure/formula $[\text{Ru}(\text{cod})\text{Cl}_2]_n$ is incomplete because n is not defined. This is not persuasive because $[\text{Ru}(\text{cod})\text{Cl}_2]$ is the reactive unit n only specifies that it is a dimer, trimer, etc. and the skilled artisan would appreciate that the formula weight for $[\text{Ru}(\text{cod})\text{Cl}_2]$ can easily be calculated so the right amount of moles of metal can be measured with no guessing on the practitioners part, contrary to applicants assertion that the skilled artisan would not know how much to add.

Applicants also question why one would pick this ligand with the certain metal complex. The reason that this is done is that the reference teaches new ligands and it is well known that the ligands by themselves have no catalytic activity unless combined with a metal and the reference show exemplary metal compound precursors that the references ligand can be reacted with to form new catalytic compounds.

Applicants also try to argue that since Sumi does not teach that this mixture would anticipate the instant claims and that it would be extremely difficult to predict the reaction chemistry. This is found not persuasive because while granted it is often times difficult to impossible to predict the catalytic reactivity of a new compound without testing it, but this is not where the problem lies, since synthesis of metal compounds based on coordination chemistry is **EXTREMELY** predictable, and if it wasn't so, applicants either would not be able to produce their catalyst or it would not be enabled since there is no disclosure on how to make the myriad of different compounds claimed. Furthermore, the metal precursors all have neutral and ionic ligands, and it is well known that a neutral ligand cannot replace an ionic ligand therefore, the neutral ligands must replace other neutral ligands, and the precursors for neutral ligands have either cyclooctadiene (COD), which is well known to be a weakly coordinating ligand that would be instantly replaced by a stronger donor atom such as nitrogen or phosphorous, or monodentate nitrile ligands and since the ligands from the reference are all chelating (bidentate) and it is well known in the art that the chelate effect will all things being equal will replace two monodentate ligands with a bidentate one, and amine are better donors than nitriles because of polarization due to hybrid orbitals (nitriles are sp amines are sp^3) secondly phosphine donors are stronger donors than nitriles so this is even more evidence that the monodentates nitriles will be replaced by the bidentate amino-phosphine ligand.

The examiner has included copies of selected chapters from two text books clarify his position and to exemplify 1.) the chelate effect and 2.) to show that metal

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complexes of 1,5-cyclooctadiene (COD) are well known starting materials in the synthesis of metal complexes as they are deemed to be of intermediate stability. For a discussion of the chelate effect. See Harris, Daniel C.; "Quantitative Chemical Analysis"; fifth edition; 1982; pgs. 306-329. See Shiver et al.; "Inorganic Chemistry" third edition; 1999 pgs. 245-247, 467-482, and 562, especially look at page 562, for a discussion of COD ligands.

Applicants argue that the chemistries of Buchwald do not relate to the chemistries to obtain the catalyst. This is found not persuasive because the claims are directed to a composition not a method for catalysis, and even if the reference makes the compounds through another route, method of making does not impart patentability to a composition claim.

Applicants then argue that examiner has not provided evidence that the chelating agents will react with the monodentate ligands. This is not persuasive because examiner is not arguing that the chelating ligand will react with the mono-dentate ligand, but that it will react with the metal complex to replace the mono-dentate ligand. A copy of the chapter on chelation from "Quantitative Chemical Analysis" has been supplied to clarify this matter.

Applicants continually argue that the examiner is picking and choosing from the reference to show anticipation, and that this is improper. This is found not persuasive because examiner is not picking and choosing as the references teach ligands useful

for catalyst compounds, and show exemplary metal starting materials that these ligands can be reacted with to form new metal complexes containing the ligands, and based on the knowledge of those of ordinary skill in the art of coordination chemistry would indeed readily understand what the new complexes made from the ligands and starting materials would look like, contrary to applicants assertion that this is not the case.

Furthermore, thermodynamics can be used to successfully predict which reactions will take place between the starting materials and the ligands based on bond strength data, since the entropy of ligand replacement is very near zero because there are the same number of species on each side of the equation, and therefore, the reaction will be controlled by enthalpy. This argument also applies to applicant's analogous argument against the Zhang reference.

Applicants argue that the language from Sumi "carbon-carbon bond formation" reads on such a multitude of possibilities that the ordinary practitioner would not expect this to mean olefin polymerization. This is found not persuasive because: 1.) If there are such a huge multitude of possibilities that someone would not be expected to understand that this can read on polymerization, examiner kindly request applicants to point out all these possibilities, as examiner is not aware of more than two or three. Furthermore, this is an example of intended use which does not serve to add patentability to a claim.

Applicants argue that the abstractable ligands are selected from "hydride radicals, hydrocarbyl radicals, substituted hydrocarbyl radicals, or hydrocarbyl organometalloid radicals". This is found not persuasive because the claims for example claim 27 clearly shows the abstractable ligands as being halogens such as chlorine and bromine. However, a new rejection has been applied that makes this matter moot.

Applicants argue that the primary references do not teach that the composition is prepolymerized, the use of a second catalyst, or the use of a support. This is found not persuasive because 1.) There are no claim limitations requiring the composition to be prepolymerized 2.) The new rejections teach the use of a second catalyst/activator/co-catalyst and 3.) The new rejections teach the use of a support.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James E. McDonough whose telephone number is (571)272-6398. The examiner can normally be reached on 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jerry Lorengo can be reached on (571)272-1233. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JEM 7/27/2007



MICHAEL MARCHESCHI
PRIMARY EXAMINER